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MONTANA DEPARTMENT OF FISH AND GAME
Environment and Information Division

SUMMER BIOLOGY OF ELK ON THE EAST BOULDER PLATEAU, BEARTOOTH MOUNTAINS

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Prepared by

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INTRODUCTION:

Exploratory mining has been carried on in the vicinity of the East Boulder Plateau in the Beartooth Mountains for approximately 15 years. There are many early pits which have not been reclaimed, but some reclamation has been conducted in recent years.

The Montana Department of Fish and Game received a grant from American Metal Climax, Inc. to help evaluate the effects of mining on elk in Placer Basin and along the East Boulder Plateau. Field studies commenced in July, 1972.

FIELD OBJECTIVES:

Study the summer biology of elk on the East Boulder Plateau to include distribution, range use, food habits and productivity.

METHODS:

Elk were observed with the aid of 7 x 35 mm. binoculars while traveling the study area on foot, or from aerial flights. Each elk or group of elk was classified to age (calf-adults), sex, activity, and location according to vegetation type. The location of each elk observation was also plotted on a topographic map.

Elk summer food habits were determined by examining feeding sites shortly after their use by feeding animals. One bite on a plant constituted one instance of use as described by Knowlton (1960). The number of instances of use for each plant species was computed as a percentage of the total for each feeding site. The aggregate percentage method (Martin et al, 1946) was used to tabulate the diet of elk at the feeding sites.

An index of productivity was determined for elk from bull/cow and calf/cow ratios.

Measurements of low-growing vegetation were made in areas of frequent elk sightings. At each site the vegetation within twenty 2 x 5 decimeter plots was examined (Daubenmire, 1959). Plots were spaced at 5-foot intervals along a 100-foot line. Canopy coverage and frequency of occurrence for each low-growing taxon was estimated for each plot.

Line intercept measurements were also made on willow (Salix spp.) and shrubs in areas of frequent elk sightings (Canfield, 1941). Any part of a willow, leaves or stem, that crossed the 100-foot line was counted as intercept.

All the measurements on low-growing vegetation and willow were recorded in open meadows. No quantitative data on vegetation composition was made for the timbered areas. Twelve permanent vegetation transects were established for the vegetation measurements taken, half on low-growing vegetation and half on willow.

A 6-foot metal fence post, with a numbered metal tag, marks one end of each transect. These transects are located on a topographic map which is separate from this report.

DESCRIPTION OF STUDY AREA:

The study area, Figure 1, referred to as the East Boulder Plateau, comprises approximately 30 square miles of the Gallatin and Custer National Forest in the Beartooth Mountains adjacent to the town of Nye, Montana. Within the study area elevations range from 8,800 to over 10,000 feet. The area, bisected by the East Boulder River, is bordered by the Boulder River on the west and the West Stillwater on the southeast. Two major open meadows within the East Boulder Plateau are Placer Basin and Breakneck Plateau (Figure 1). Breakneck Park, to the east of

Figure 1. The East Boulder Plateau study area.

Breakneck Plateau, is also of significance. The study area consisted mainly of a lodgepole pine/spruce forest with open grassy parks and boggy meadows (Figures 2, 3 and 4).

Human activities include exploratory mining, sheep grazing from the early 20's until 1966, camping, four-wheel driving, and hunting.

RESULTS:

Vegetation

The study area was mostly forested. In some sections it was possible to see approximately 50 yards into the forest, while in other areas dense timber and heavy deadfall limited visibility to about 50 feet (Figure 5). The forest understory consisted mainly of huckleberry (Vaccinium spp.), rock and litter.

Open parks and meadows were boggy at some time during the season. From elk tracks made during spring and early summer, it was evident that ground which appeared dry in midsummer had been been wet earlier in the season. Snow melt in early fall again made the ground soft. Many of the open meadows remained spongy all summer and some areas held standing water (Figure 6). The major low-growing taxa included several species of sedge (Carex spp.), poverty oatgrass (Danthonia spictata), tufted hairgrass (Deschampsia caespitosa), marsh marigold (Caltha rotundifolia), peregrine fleabane (Erigeron peregrinus), groundsel (Senecio subnudus), and willow.

Table 1 shows the average canopy coverage and frequency for low-growing taxa found on the two major areas of elk summer range. Table 2 shows willow density determined from line intercepts.

Figure 2. Breakneck Plateau. Foreground - boggy; background - dry.

Figure 3. Wet meadow in Placer Basin.

Figure 4. Placer Basin. X marks elk sitings. East Boulder River in foreground.

Figure 5. Lodgepole pine/spruce forest.

Figure 6. Breakneck Plateau - boggy meadow.

Table 1. Percent canopy coverage (percent of area covered) and frequency (percent occurrence among plots) of plants in the open meadow vegetation type as determined by examination of 120 2x5 decimeter plots.

	Placer Basin	Breakneck Plateau	Combined
GRASS & SEDGE:			
Carex spp.	38/97	38/100	38/99
Danthonia spicata	18/58	11/67	14/63
Deschampsia caespitosa	5/37	20/70	13/54
Festuca spp.	5/38	3/18	4/28
Juncus spp.	1/3	tr/2	tr/3
Phleum alpinum	2/20	9/68	5/44
Poa spp.	tr/2	7/53	3/28
TOTAL GRASS & SEDGE	62/100	76/100	69/100
FORBS:			
Agoseris glauca	-	2/17	1/9
Antennaria spp.	13/83	15/92	14/88
Caltha rotundifolia	26/90	2/17	14/67
Erigeron peregrinus	16/80	6/38	11/59
Geranium viscosissimum	tr/2	-	tr/1
Lupinus sericeus	-	3/27	1/14
Pedicularis groenlandica	2/18	1/17	2/18
Penstemon spp.	-	1/8	1/4
Potentilla diversifolia	3/30	8/65	6/48
Saxifraga columbiana	tr/2	tr/2	tr/2
Sedum spp.	tr/3	-	tr/2
Senecio integerrimus	tr/2	-	tr/1
Senecio subnudus	28/95	6/43	17/69
Sibbaldia procumbens	2/18	7/67	5/43
Unidentified forbs	8/40	3/43	7/47
TOTAL FORBS	75/100	43/100	59/100
SHRUBS:			
Pinus ponderosa[1]	1/3	-	tr/2
Salix spp.	1/3	-	tr/2
Vaccinium scoparium	1/7	1/5	1/6
TOTAL SHRUBS	2/8	1/3	1/6
Bareground	6/40	4/43	5/42
Rock	1/7	4/8	2/8
Moss	12/87	8/55	10/71
Lichen	1/8	4/25	2/17
Litter	2/17	5/33	4/25

[1]Seedling *Pinus ponderosa* - 2 foot high or less

Table 2. Willow density from examination of six 100-foot line intercepts.

Transect Number	Date	Location	No. of Plants	Range of Intercepts (in.)	Total Intercepts (in.)	Percent Intercept (Density)
201	9/ 7/72	Placer Basin	10	1" -49"	216.5	18
202	9/ 6/72	Placer Basin	7	0.5" -29.5"	116.5	9.7
206	9/12/72	Placer Basin	5	8.5" -72.5"	254	21
207	9/14/72	Breakneck Plateau-North End	12	1" -35"	155.5	13
210	9/13/72	Breakneck Plateau	8	1" -23"	83	7
212	9/13/72	Breakneck-Trail Ck.	-	-	366	30.5

DISTRIBUTION AND RANGE USE:

Three hundred and seven observations of elk were recorded between July 17 and September 24, 1972, as to vegetation type and location. Aerial and ground observation of elk plus fresh elk sign, signifying recent use of an area, are plotted on Figure 1. Seventy-five percent of all observations were in meadows, 12 percent in timber and 14 percent on the edge of timber. During August, 79 percent of all observations were made in meadows, 15 percent in timber and 6 percent on the edge of timber. For September, only 54 percent of the elk were observed in meadows, 12 percent in timber and 34 percent on the edge of timber. These percentages do not represent relative use of different areas or habitat by elk, since it was difficult to locate them in timber. It does indicate a change in the use of open areas.

During July and early August, elk were usually observable in open meadows from daylight to about 8:00 a.m., after which they returned to the timber. Meadows were again utilized starting about 7:45 p.m. until after dark. About August 20, elk observations began to decrease, but large bulls became more numerous. This appeared to be related to the beginning of the rut, since I

did not see any large bulls until the start of the rutting season (Stevens, 1965), (Knight, 1967), (Coop, 1971). Elk were heard bugling for the first time on August 29.

A group of 16-20 elk used the south end of Placer Basin throughout the summer. When first observed on July 17, they were about midway in the Basin, but gradually moved to the southern end of the meadow. These elk may have mixed with the larger herd on Breakneck Plateau to the south; however, the numbers and composition of the herd remained stable throughout the summer. On September 21, these elk were again seen midway in the Basin, at the base of Iron Mountain, where they had first been spotted in July (Figure 4). It appeared these elk had made a complete circuit of their summer range and were beginning to drift back to fall range. Feeding occurred in the same area utilized two months previously.

Elk use of open meadows on Breakneck Plateau followed a similar pattern. On August 7, a herd of 94 elk was observed on the plateau. These elk appeared to cross the plateau readily and use drainages on both sides. Elk used the large plateau consistently in July and early August, but by late August use had decreased substantially. The use of small parks on both sides of the plateau increased.

The decreased use of large open meadows throughout the summer did not appear to be entirely due to desiccation of vegetation, since much of the vegetation was still green, but not as succulent as that found in small parks in the timbered areas. The rutting season most likely also influenced change of habitat use (Cole, 1963).

Many of the small meadows and most of Placer Basin and Breakneck Plateau were very moist, with some areas holding standing water throughout the summer. Even some of the drier areas became boggy after a hard rain or snow melt.

Elk were observed throughout the summer in meadows with two to three inches of standing water. During the rutting season such areas might have contained an elk wallow. Ground that was relatively dry by the end of July was much wetter earlier in the season and appeared to have been used more by elk at that time. Elk tracks four to five inches deep in the turf were not uncommon. It should not be inferred that the wet meadow was preferred by elk. Most of the meadows used by elk were only moist.

On Breakneck Plateau, elk used two areas continually that were not too boggy, but both eventually led down into some wet meadows or had small creeks running through them. Both areas were at the head of steep drainages (Figure 7). Coop (1971), working in the Little Belt Mountains of Montana, found elk using similar areas. The open, flat, relatively dry plateau between the two drainages was used for feeding mainly in June and July (Figure 2). Elk continued to cross it throughout summer and early fall.

Breakneck Park presented a good example of elk summer habitat. It was located on a steep slope connected with other parks by paths through the timber and was either wet or had a stream running through it (Figure 8).

The timbered areas used by elk for escape cover and resting during the day included two densities: heavy timber interspersed with small parks and meadows, or sparse timber with an open canopy and resulting understory of vegetation and some interspersed wet meadows. Coop (1971) stated that wet areas used by elk were characterized by having forbs, while wet areas with sedges received little use. I observed a similar occurrence in that elk seemed to prefer areas that had an abundance of forbs.

Figure 7. Trail Creek - east side of Breakneck Plateau.

Figure 8. A park used by elk. West Stillwater River in background.

FOOD HABITS:

Twelve feeding sites representing 927 instances of use were obtained over a 10-week period between July 17 and September 24 (Table 3). The single most important species was willow, constituting more than one-third of the elk summer diet. Extensive elk use of willow was further verified by an elk exclosure adjacent to the study area on the West Stillwater River. Willow inside the exclosure was high and bushy while willow outside was low, hedged and not as dense.

Two or three species of sedge were also important, forming 20 percent of the diet. A few of the more important forbs were peregrine fleabane, western bistort (Polygonum bistortoides), and marsh marigold. Shrubs comprised 39 percent of the elk summer and early fall diet, grass and sedges 35 percent and forbs 26 percent.

PRODUCTIVITY:

The calf/cow ratio calculated from all summer observations of elk was 38 calves per 100 cows. According to Gene Allen (pers. comm., 1972), this is about average for Montana elk herds in general. The bull/cow ratio for the entire summer was 17 bulls per 100 cows, and the ratio for the rutting season was 29 bulls per 100 cows.

Table 3. Percentage of items in the summer and early fall diet of elk as determined from 927 instances of use at 12 feeding sites.

GRASS AND GRASSLIKE PLANTS:	
Bromus marginatus	5
Carex spp.	20
Deschampsia caespitosa	6
Juncus spp.	4
Phleum alpinum	tr
TOTAL GRASS AND GRASSLIKE PLANTS:	35
FORBS:	
Caltha rotundifolia	5
Erigeron peregrinus	8
Linaria spp.	1
Pedicularis groenlandica	tr
Polygonum bistortoides	6
Saxifraga columbiana	tr
Taraxacum spp.	1
Unidentified forbs	5
TOTAL FORBS:	26
SHRUBS:	
Salix spp.	37
Vaccinium scoparium	2
TOTAL SHRUBS:	39

DISCUSSION:

There have been and are many factors influencing the production, survival, and fluctuations of the East Boulder Plateau elk herd. As previously mentioned, sheep grazed the area from the early 1920's until 1966 (Appendix, Table 1). Sheep grazed on elk summer range (Breakneck Plateau, and to the west, Breakneck Park, Trail Creek and Hidden Creek) and cattle grazed elk winter range (Horseman Flat). This must have had an impact on the elk herd, since there is often direct forage competition between domestic sheep and elk (Stevens, 1966) plus the disturbance and displacement factor the sheep had on the elk. Elk tend not to associate with livestock, especially sheep, and may leave an area if livestock move in (Eustace, 1967). The removal of the sheep no doubt has had a beneficial effect on the elk.

A more recent potential danger to the well being of the herd is the increasing exploratory mining (Figures 9 and 10). The presence of a small number of mines probably does not affect the elk directly, but expanded exploration could. Several meadows were "flagged" by mining companies such as the one shown in Figure 3. If the highly important meadows are dug up, this will virtually eliminate the elk habitat, since the meadows appear to supply the bulk of the elk summer food. Figure 1 shows most of the elk activity lying south of the present mining claims and operations. This does not necessarily mean that present operations have pushed the elk south, since no study had been done previous to mining in this area. It does mean, however, that any further movement south by the mining companies will cut serious inroads into elk habitat and into the production and survival of the herd.

Another growing problem is the increased use of four-wheel drive vehicles for hunting, camping, and enjoyment in this delicate, moist country. There were numerous examples where vehicles made ruts in boggy meadows and diverted small

Figure 9. Exploratory mining pit - Placer Basin.

Figure 10. Exploratory mining pit 12-15 years old - Placer Basin.

creeks (Figure 11). Tracks made across relatively dry ground remain evident all summer. At present the number and frequency of such visits to this high country do not seem serious, but expanding populations may place more emphasis on outdoor activities, which could create a pressing problem in a very few years. Continued use by increasing numbers of people on these meadows can cause vegetation destruction and deterioration, plus an annoyance and crowding factor to the elk.

Figure 11. Placer Basin - ruts and creek diversion from four-wheel drives.

RECOMMENDATIONS:

1. Urge the Forest Service to maintain present status of East Boulder Plateau and Horseman Flat for elk, with no domestic sheep and cattle grazing.
2. Restrict mining to its present southern boundary. Especially safeguard Placer Basin, Iron Creek, Breakneck Plateau and the parks to the east and west of it.
3. Restrict motorized vehicles to established roads. Forest Service trails for use by hunters and campers on foot or horseback only. Exception: under proper snow conditions, snowmachines may be used to haul out killed elk or other big game species.
4. Any development of areas presently utilized by elk be preceded by a project to define plant communities and replace the vegetative characteristics required by summering elk.

APPENDIX

Appendix Table 1. Grazing record.

Year	Grazing Season	No. of Cattle Grazed Horseman Flats	Grazing Season	No. of Sheep Grazed - Trail & Hidden Creeks
1922	6/1 - 9/30	166	7/1 - 9/30	1087
1923	6/1 - 9/30	110	7/1 - 9/15	1104
1924	6/1 - 9/30	152		-
1925	6/1 - 9/30	155	7/10- 9/30	1115
1926	6/1 - 9/30	155	7/10- 9/30	1100
1927	6/1 - 9/30	155	7/10- 9/30	1091
1928	6/1 - 9/30	130	7/10- 9/10	1150
1929	6/1 - 9/30	130	7/10- 9/10	1050
1930	-	130	-	1100
1931	-	130	-	1100
1932	-	130	-	1085
1933	-	130	-	1170
1934	-	125	-	1250
1935	6/1 - 9/30	130	7/10- 9/10	1100
1936	6/1 - 9/30	125	7/10- 9/10	1100
1937	6/1 - 9/30	80	7/10- 9/10	1078
1938	6/1 - 9/30	109	7/10- 9/9	1100
1939	6/1 - 9/30	105	7/11- 9/10	900
1940	6/1 - 9/30	105	7/11- 9/10	1050
1941	6/1 - 9/30	105	7/11- 9/10	1100
1942	6/1 - 9/30	105	7/11- 9/10	1100
1943			7/11- 9/10	1025
1944			7/20- 9/4	1160
1945			7/18- 9/10	1115
1946			7/8 - 9/4	990
1947			7/9 - 9/6	870
1948			7/7 - 9/4	700
1949			-	None
1950			-	None
1951			7/26- 9/1	1000
1952			7/21- 9/3	1000
1953			? - 9/3	1000
1954			7/24- 9/2	1000
1955			7/17- 9/8	1000
1956			7/14- 8/31	1000
1957			7/27- 9/3	980
1958			7/30- 9/3	900
1959			7/27- 8/31	900
1960			7/23- 8/23	1080
1961			7/27- 8/31	900
1962			-	None
1963			7/26- 8/31	900
1964			-	None
1965			8/9 - 9/3	750
1966			7/27- 8/31	900
1967			-	None
1968			-	None
1969-1972			-	None

Literature Cited

Allen, E. 1972. (Personal communication). Res. Biol., Mont. Dept. of Fish & Game.

Booth, W. E. 1950. Flora of Montana, Part I, conifers and monocots. Res. Foundation at Mont. St. Univ., Bozeman, Mont. 232 p.

_____ and J. C. Wright. 1959. Flora of Montana, Part II, dicotyledons. Mont. St. Univ., Bozeman, Mont. 280 p.

Canfield, R. H. 1941. Application of the line interception method in sampling range vegetation. Jour. Forestry, 39: 388-394.

Cole, G. F. 1963. Jackson Hole cooperative elk studies. Natl. Park Serv. Prog. Rep. 1962-63. Unpubl. multilith. Grand Teton Natl. Park, Wyoming. 64 p.

Coop, K. J. 1971. Habitat use, distribution, movement and associated behavior of elk, Little Belt Mountains. Unpubl. M.S. Thesis. Mont. St. Univ., Bozeman, Mont. 61 p.

Daubenmire, R. F. 1959. A canopy-coverage method of vegetational analysis. N.W. Sci. 33(1):43-64.

Eustace, C. D. 1967. Food habits, range use and relationships between elk and livestock in the Gravelly Mountains, Montana. Unpubl. M.S. Thesis. Mont. St. Univ., Bozeman, Mont. 55 p.

Knight, R. R. 1967. Elk population trends, food habits and range relationships in the Sun River area. Mont. Dept. of Fish & Game, Job Comp. Rep. W-98-R-6 & 7.

Knowlton, F. F. 1960. Food habits, movements and population structure of moose in the Gravelly Mountains, Montana. J. Wildl. Mgmt. 24(2):162-170.

Martin, A. C., R. H. Gensch and C. P. Brown. 1946. Alternative methods in upland game bird food analysis. J. Wildl. Mgmt. 10(1):8-12.

Stevens, D. R. 1966. Range relationships of elk and livestock, Crow Creek drainage, Montana. J. Wildl. Mgmt. 30(2):349-363.